Phase and Interfacial Tension Behavior of Certain Model Gas Condensates: Measurements and Modeling

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This contribution reports on the phase and interfacial tension behavior of some model high-temperature-high-pressure gas condensates. On the one hand these type of gas condensates are becoming of major interest for the oil industry, while on the other hand their phase and interfacial tension behavior have not been very well studied. For three different model gas condensates, two consisting of three n-alkanes (methane, butane and decane) and one consisting of five n-alkanes (methane, butane, heptane, decane and tetradecane), experimental results on their fluid phase behavior have been obtained in the temperature region $270 < T/K < 490$ and up to pressures as high as 24 MPa. Also critical points of the three mixtures have been determined experimentally. All mixtures show an extended retrograde region.

Using the Peng-Robinson equation of state, the phase behavior of the three mixtures was modeled. In addition, also the interfacial tension behavior of three model gas condensates was modeled. For that purpose, the Cahn-Hilliard theory was applied in combination with the Peng-Robinson equation of state. Satisfactory modeling results were obtained. As an additional feature, this computational approach was extended to mixtures composed of up to twenty components.